Claims

1. A medical simulator apparatus configured to facilitate auditory screening simulation and testing, comprising:

at least one structural representation of a human ear, said at least one structural representation including a pinna, and a partially enclosed internal ear canal passage opening to said pinna, said internal ear canal passage terminating in a cavity distal from said opening;

a microphone disposed in said cavity;

an auditory emitter mechanism disposed in said cavity;

a computer operatively coupled to said microphone and said auditory emitter mechanism, said computer configured with at least one software module to receive signals from said microphone, and to control said auditory emitter mechanism in response to said received signals.

2. The medical simulator apparatus of Claim 1 wherein said internal ear canal passage is at least partially collapsed in a first state, and unobstructed between said pinna and said cavity in a second state; and

wherein auditory signals passing through said internal ear canal in said first state are attenuated.

3. The medical simulator apparatus of Claim 2 wherein said auditory signals passing through said internal ear canal in said first state are attenuated by at least 5dB in the frequency range from 1000 Hz to 8000 Hz.

4. The medical simulator apparatus of Claim 1 wherein said computer is configured with at least one software module to control said auditory emitter mechanism to simulate human otoacoustic emissions in response to audible input received at said microphone.

5. The medical simulator apparatus of Claim 4 wherein said computer is further configured with at least one software module to control said auditory emitter mechanism to simulate abnormal human otoacoustic emissions in response to audible input received at said microphone.

6. The medical simulator apparatus of Claim 4 wherein said computer is further configured with said least one software module to control

said auditory emitter mechanism to combine one or more noise signals with said simulated otoacoustic emission.

7. The medical simulator apparatus of Claim 6 wherein said one or more noise signals are selected from a set of noise signals consisting of random noise signals and previously recorded external noise signals.

8. The medical simulator apparatus of Claim 1 further including at least one operator selectable control operatively coupled to said computer, said operator selectable control configured to receive operator input.

9. The medical simulator apparatus of Claim 1 further including a second structural representation of a human ear, said second structural representation including a second pinna, and a second partially enclosed internal ear canal passage opening to said pinna, said second internal ear canal passage terminating in a second cavity distal from said opening; and

wherein said second internal ear canal passage and said second cavity are configured to have acoustic properties corresponding to the acoustic properties of a deaf human ear.

10. The medical simulator apparatus of Claim 1 further including a structural representation of a anatomical human head affixed to at least a representation of a partial human torso; and

wherein said at least one structural representation of said human ear is positioned in an anatomically accurate location on structural representation of said human head.

11. The medical simulator apparatus of Claim 10 wherein said structural representation of said anatomical human head affixed to at least a partial human torso is an anatomically accurate representation of a human neonate.

12. The medical simulator apparatus of Claim 10 further including at least one electrically conductive sensor contact point adjacent an exterior surface of said structural representation of said human head and torso; and

wherein said computer is operatively coupled to said at least one electrically conductive sensor contact point to present one or more electrical signals thereto.

13. The medical simulator apparatus of Claim 12 wherein said computer is configured with at least one software module to present electrical signals at said at least one electrically conductive sensor contact point to simulate auditory brainstem response bioelectric signals in response to audible input received at said microphone.

14. The medical simulator apparatus of Claim 13 wherein said computer is configured with at least one software module to modify said electrical signals presented at said at least one electrically conductive sensor contact point to simulate auditory brainstem response bioelectric signals representative of abnormal patient auditory function.

15. The medical simulator apparatus of Claim 12 wherein said computer is configured with at least one software module to selectively present one or more bioelectric noise signals at said at least one electrically conductive sensor contact point, said one or more bioelectric noise signals selected from a set of noise signals consisting of random noise signals and previously recorded external noise signals.

16. The medical simulator apparatus of Claim 12 wherein said computer is configured with at least one software module to present electrical signals at said at least one electrically conductive sensor contact point to simulate human brainwave bioelectric signals.

17. The medical simulator apparatus of Claim 16 wherein said computer is configured with at least one software module to modify said electrical signals presented at said at least one electrically conductive sensor contact point to simulate human brainwave bioelectric signals representative of varying degrees of awareness.

18. A method for training a medical technician in the use of an auditory screening system utilizing an structural representation of an anatomically correct human ear, the structural representation including an pinna,

an internal ear canal opening within the pinna, a microphone disposed within the internal ear canal, an acoustic emitter mechanism disposed within the internal ear canal, and a computer operatively coupled to the microphone and the acoustic emitter mechanism, comprising the steps of:

selecting, at the computer, an auditory condition to be simulated, said auditory condition representative of a degree of simulated patient hearing abnormality and a degree of auditory noise;

operatively coupling the auditory screening system to said structural representation;

actuating said auditory screening system to present an auditory stimulus to said internal ear canal;

receiving said auditory stimulus at the microphone;

generating, with said computer, an simulated otoacoustic auditory emission at said acoustic emitter mechanism in response to said received auditory stimulus; and

receiving said simulated otoacoustic auditor emission at said auditory screening system.

19. The method of Claim 18 wherein the structural representation includes at least one electrically conductive sensor contact point operatively coupled to said computer, and further comprising the steps of:

generating, with said computer, an simulated auditory brainstem response bioelectric signal at said at least one electrically conductive sensor contact point in response to said received auditory stimulus; and

receiving said simulated auditory brainstem response bioelectric signal at said auditory screening system.

20. A method for training a medical technician in the use of an bioelectric signal measurement system utilizing an structural representation of an anatomically correct human head coupled to a partial human torso, at least one electrically conductive sensor contact point disposed adjacent an external surface of said structural representation, and a computer operatively coupled to

the at least one electrically conductive sensor contact point, comprising the steps of:

selecting, at the computer, an bioelectric signal to be simulated, said simulated bioelectric signal representative of a degree of simulated patient awareness and a degree of signal noise;

operatively coupling the bioelectric signal measurement system to said structural representation;

actuating said bioelectric signal measurement system to measure bioelectric signals;

generating, with said computer, an simulated bioelectric signal at the at least one electrically conductive sensor contact point; and

receiving said simulated bioelectric signal at said bio-electric signal measurement system.

21. The method of claim 20 further including the step of selectively altering, at said computer, said simulated bioelectric signal to represent the effect of sedation on a patient.

22. A medical training device comprising:

at least a partial representation of a human patient;

one or more sensor contact points disposed on said partial representation, each of said one or more sensor contact points configured to deliver an electrical signal;

a processor operatively coupled to said one or more sensor contact points and configured to deliver simulated bioelectric signals said one or more sensor contact points; and

wherein said processor is further configured to selectively alter one or more parameters of said simulated bioelectric signals, said one or more parameters including signal noise, signal timing, and signal distortion, whereby said simulated bioelectric signals are be representative of naturally occurring normal and abnormal human bioelectric signals.

23. The medical training device of Claim 22 further including:

a microphone disposed in said partial representation of a human patient, said microphone operatively coupled to said processor; and

wherein said processor is configured to deliver simulated auditory brainstem response bioelectric signals to said one or more sensor contact points responsive to auditory signals received from said microphone.

24. The medical training device of Claim 22 further including:

an acoustic emitter disposed in proximity to said microphone, said acoustic emitter operatively coupled to said processor; and

wherein said processor is configured to control said acoustic emitter to generate simulated human otoacousitic emissions responsive to auditory signals received from said microphone.

25. A medical simulator apparatus configured to facilitate auditory screening simulation and testing, comprising:

a structural representation of a human nose and mouth;

at least one source of gas operatively coupled to said structural representation, whereby gas selectively released from said at least one source of gas is expelled through said structural representation;

a computer operatively coupled to said source of gas, said computer configured with at least one software module to control said source of gas for selective discharge of gas through said structural representation of a human mouth and nose.

26. The medical simulator apparatus of Claim 25 further including a structural representation of a anatomical human head affixed to at least a representation of a partial human torso; and

wherein said structural representation of said human mouth and nose is positioned in an anatomically accurate location on structural representation of said human head.

27. The medical simulator apparatus of Claim 25 wherein said at least one source of gas consists of a source of carbon monoxide, a source of carbon dioxide, and a source of oxygen.

28. The medical simulator apparatus of Claim 27 wherein said computer is further configured to selectively mix gases from said source of carbon monoxide, said source of carbon dioxide, and said source of oxygen for discharge through said structural representation of a human mouth and nose to simulate a human breath cycle.

29. A medical simulator apparatus configured to facilitate auditory screening simulation and testing, comprising:

a structural representation of a anatomical human head affixed to at least a representation of a partial human torso

a selectable polychromatic component disposed on a surface of said structural representation, said selectable polychromatic component controllable to display a range of human skin tones;

a computer operatively coupled to said selectable polychromatic component, said computer configured with at least one software module to control said selectable polychromatic component to display a range of human skin tones selected from a set of human skin tones representative of normal health conditions, hypoxia, and the present of bilirubin.